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FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS
WASHINGTON, D.C., U.S.A.

Economic Notes

Primary Production

Since publication in the March-April issue of figures for landings in 1949, further statistical information has been received by the Fisheries Division of FAO. A country-by-country summary of this newer information, in relation to figures for earlier years, is given in Table 7. From perusal of the table it will be seen that although the total catch for each region did not change appreciably from that for 1948 there were considerable variations in different countries. Some of the more important of these changes, are commented upon below.

Herring and allied species. Most important producers experienced smaller catches of herring in 1949 than in 1948. In the United Kingdom the 1949 catch amounted to only 77 percent of the 1948 catch; in Norway the total 1949 catch of these species was 70 percent of the catch for 1948. The same downward tendency is found in Portugal, Belgium, Canada, and notably in Iceland where the herring catch in 1949 was only 33 percent of 1947 and 47 percent of the catch for 1948. On the other hand, the United States of America caught 19 percent more herring and allied species in 1949 than in 1947. Denmark, where the floating trawl was used, and Finland each experienced a somewhat larger catch in 1949 than in the previous year.

Tunas, true mackerels, etc. Landings figures available from the United States of America show that 1949 landings (190,500 tons) were 95 percent of those for 1947 (1948 figures are not available). Smaller producers reported 1949 landings as follows: Canada, 17,000 tons; Denmark, 17,000 tons; France, 43,000 tons; Ireland, 1,000 tons; Italy, 3,000 tons; Netherlands, 7,000 tons; Norway, 16,000 tons; Portugal, 7,000 tons; United Kingdom, 7,000 tons.

Cod, hake, and allied species. Most of the important producers reporting to FAO had larger landings in 1949. In the United States of America the total catch amounted to 118 percent of the catch for 1947; in other countries, where 1948 figures are available, the 1949 catch compared with 1948 as follows: United Kingdom, 104 percent; Portugal, 123 percent; Norway, 103 percent; France, 111 percent. In Canada and Iceland, however, production of these species was somewhat smaller than in 1948.

Salmon and allied species landed in Canada in 1949 (71,500 tons) increased 11 percent over 1948. In the United States of America landings in 1949 (213,200 tons) were 94 percent of those in 1947. The United Kingdom landed 2,000 tons in 1949; Ireland, 1,000 tons; Norway, 900 tons; Finland, 500 tons; and Denmark, 3,000 tons.

Eight countries which in 1949 accounted for a total catch of 5,846,300 metric tons have reported the result of their fishing activities during the first few months of 1950. A summary of their reports is given in Table 8, page 44.

Table 7. - Landings of Fish, 1946-49

Country	1946	1947	1948	1949	1949 as percentage of 1948
	(..... Metric tons a/ .....)				(Percent)
Europe					
Belgium	74 000	81 200	70 900	68 300	96
Denmark	201 400	212 400	225 800	255 000	113
Finland	49 100	46 100	46 100	65 700	143
France b/	244 500	306 600 c/	391 200	384 100	98
Germany d/	264 800	279 800	380 200	471 000	124
Iceland	368 200	477 200	464 700	394 200	85
Ireland	22 400	21 500	25 900	18 200	70
Italy	160 200	132 500	138 000	152 000	110
Netherlands	190 400	247 300	269 400	235 800	88
Norway	971 900	1 187 800	1 386 500	1 165 700	84
Poland	23 300	39 500	48 200	...	...
Portugal	306 000	280 500	273 800	282 500	103
Spain	594 200	542 400	523 300	...	...
Sweden	183 700	178 800	207 800	200 800	97
United Kingdom	1 031 800	1 138 600	1 195 700	1 152 400	96
Asia					
Japan f/	3 177 500 g/	2 472 100	2 332 600 h/	2 923 000 i/	125
Philippines	53 300	79 700	66 500	75 500	114
South Korea	298 700	302 000	285 300	294 500	103
Thailand	...	...	161 000	195 800	122
South America					
Chile	60 900	60 100	64 700	76 200	118
Ecuador	...	...	22 400	17 900	80
North and Central America					
Canada	623 000	574 100	658 100 j/	604 900 j/	92
Newfoundland	377 300	278 100	374 900	265 500 d/	71
Honduras	...	...	77	92	119
Mexico	54 800	55 500	55 000*	55 000*	100
United States of America	1 995 800	2 345 100	2 433 000	2 523 300	104

NOTE: The data in this table have been obtained from official publications and from communications with official agencies in the countries concerned. In some instances FAO has made estimates based on officially recorded statistics or on data furnished in official reports of governments, missions, fisheries specialists, etc.; these estimates are indicated by an asterisk (*).

a/ Round fresh weight unless otherwise stated.
b/ Excludes crustaceans and mollusks.
c/ Continental France and Corsica only.
d/ Reported weight.
e/ Landings in Swedish ports - 183,200 tons.
f/ Excludes seaweed.
g/ Includes black-market estimate of 1,420,800 tons; excludes 34,100 tons of whales.
h/ Includes unreported landings estimated to be 304,200 tons.
i/ Includes unreported landings estimated to be 447,000 tons.
j/ Preliminary.

Table 8. - Landings in 1950 Compared with Landings During the Same Period 1949

Country	Partial year			1950 as percentage of 1949
	Period covered	1949	1950	
		(..... Metric tons a/.....)		(Percent)
Denmark	January-April	73 300 b/	72 300 c/	99
Iceland	January-April	108 200	116 800	108
Ireland	January-March	2 600	2 500	96
Netherlands	January-March	35 600	28 300	79
Norway d/	January-May	637 100	872 400	137
United Kingdom e/	January-April	262 700	257 800	98
United States of America f/	January-March	226 800	263 100	116
Canada (excl. Newfoundland)	January-April	101 700	114 500	113

a/ Reported (landed) weight unless otherwise indicated.

b/ Includes 2,565 tons landed directly in British harbors and 38 tons landed directly in Swedish harbors.

c/ Includes 893 tons landed directly in British harbors.

d/ Winter herring, spawning cod, and Finnmark cod only.

e/ Excludes Northern Ireland.

f/ Round fresh weight. Preliminary estimates.

The extremely successful winter herring fishery of Norway is reflected in the above figures. Landings in February were so large that the greatly improved outlet channels were overloaded and fishing had to be stopped for about a week to allow the processors to catch up. Cod landings, however, were not much larger than in previous years, despite the rather successful introduction of purse seines on the cod fishing grounds.

Fishing Fleets

The trend toward larger and more efficient fishing fleets was commented on in the January-February issue. Some specific instances of this trend are worth further comment.

Fishing craft have been delivered or are to be delivered shortly from Scandinavian countries to Uruguay, Colombia, and the U.S.S.R. There have also been deliveries from the United States of America to Latin America and Germany, and from the United Kingdom to Iceland. Other countries have shown considerable interest in obtaining equipment from countries with developed fisheries.

In February two Italian vessels of 1,400 and 1,600 tons respectively departed for the Grand Banks off Canada, resuming with new and modern craft activities which were initiated in the late thirties. Iceland and the United Kingdom started to fish off Canada and Greenland, and Norway and Denmark intensified their fisheries off Greenland with the likelihood of further expansion in 1950. In Poland, where fishing was on the whole less successful in 1949, the fleet continued to expand. (In 1948, 198 power units were added - 6 trawlers, 98 cutters, and 94 smaller craft.)

Processing

On the basis of reports from 18 countries accounting for some 40 to 50 percent of the 1949 world catch, one can get a rough picture of how this catch was disposed of. Of a total catch of 9,700,000 metric tons round fresh weight, 3,800,000 tons (39.2 percent)were marketed fresh, 700,000 tons (7.2 percent) were frozen, 2,100,000 tons (21.6 percent) were used for salting, drying, smoking, etc., and 1,000,000 tons (10.3 percent) were canned. About 1,600,000 tons (16.5 percent) were used for converting into oil and 500,000 tons (5.2 percent) were used for other purposes. In addition some 500,000 tons of offal from canning, filleting, etc., was also used for oil and meal production.

Production of certain fisheries commodities in the most important producing countries is given in Table 9, page 46. Unfortunately very little information is available for Asia, Africa, and Latin America although important developments are known to have taken place in a number of countries in these regions.

Most recent 1950 statistics from Norway indicate a much larger production of salted cod and stockfish as compared with 1949 at the expense of fresh and frozen fish output during the spawning cod season. In Iceland the same tendency is to be found. During the winter herring season which is now completed in Norway and which gave a total catch of 751,800 tons compared with 528,100 tons in 1949, only 56,200 tons were salted (119,500 tons in 1949) and only 55,000 tons exported fresh (117,800 tons in 1949). Consequently, a very large amount of winter herring (620,400 tons compared with 266,400 in 1949) was converted by a largely expanded oil and meal industry. Although complete information is not available, there is evidence of continued expansion of oil and meal production as well as canning activities in a number of countries, particularly in Africa and certain Latin-American countries.

International Trade

Canada encountered serious difficulties in marketing her salted cod production, not least because of difficulties in obtaining payment in hard currency. These difficulties continued in 1950 so that stocks of salted cod in the Province of Newfoundland on 20 February 1950 were 25,239 tons compared with 9,780 tons on 20 February 1949. During March and April the situation improved.

Accumulated stocks of canned sardines were reported from Venezuela. In Norway, sales of cod-liver oil and salted winter herring moved slowly, and some quantities were unsold by the end of 1949.

Total exports of canned sardines in 1949 from French Morocco amounted to some 35,000 tons which indicates that a very high level of production has been attained. Total number of canneries in June 1949 was 145 compared with 87 in December 1947 and 44 in 1938.

Table 9. - Production of Certain Fisheries Commodities by Specified Countries, 1946-49

Commodity and country	1946	1947	1948	1949
	(..... Metric tons a/.....)			
Fresh fish b/				
Belgium	29 887	34 558	29 899	32 240
Canada	134 334	121 893	103 811	91 263
Newfoundland	26 091	18 171	8 154	4 665
Chile	44 676	49 777	38 349	48 286
Denmark c/	90 000	90 000	75 600	87 000
Finland	39 000	35 000	36 280	52 825
France d/	166 500	199 000	257 260	247 300
Iceland	90 250	77 191	133 950	119 469
Ireland	19 734	17 882	19 756	12 076
Italy	136 700	112 300	116 000	129 048
Netherlands	53 962	70 131	71 029	63 415
Norway	209 550	297 500	226 794	246 204
Philippines	...	48 392	52 185	67 206
United Kingdom e/	602 458	637 148	638 809	672 101
United States of America f/	...	360 600	367 000*	374 000
Total	...	2 169 543	2 174 876	2 247 098
Frozen fish b/				
Belgium	-	-	-	274
Canada	54 586	30 701	49 875	54 195
Newfoundland	13 600	6 800	12 492	14 728
Denmark c/	1 000	3 000	7 900	11 200
Finland	200	300	1 800	1 050
Iceland	25 333	19 235	31 927	37 895
Ireland	115	110	135	130
Italy	-*	-*	-	1 104
Japan	29 975	50 000*	62 572	89 261
Netherlands	...	...	1 100	1 100
Norway	...	...	42 240	47 705
Philippines	200*	261	595	146
United Kingdom e/	...	...	18 038	24 093
United States of America f/	127 035	128 128	132 443	144 400
Total	...	...	361 117	427 281
Wet salted and dried salted cod, hake, and allied species g/				
Canada	16 530	22 493	22 854	25 500
Newfoundland	55 022	60 960	47 754	49 900
Denmark c/	1 670	1 265	1 800	2 640
Faroe Islands	6 320	15 028	13 200	23 940
France	13 912	21 912	28 116	32 300
Greenland	3 157	4 600	5 000*	7 000*
Iceland	7 214	21 260	10 578	21 200
Japan	4 325	7 313	11 391	17 592
Norway	30 300	51 400	30 000	24 000
Portugal	22 161	23 296	22 689	31 700*
Spain	18 000	20 000*	20 000*	30 000*
St. Pierre and Miquelon	1 000*	1 500	1 009	2 000
United Kingdom	2 303	1 320	1 650	2 000*
United States of America	1 107	1 237	1 000	1 000*
Total	183 021	253 584	217 041	270 772
Dried cod, hake, and allied species (stockfish)				
Iceland	140	-	6	30
Japan	3 200	1 125	6 509	1 564
Norway	14 200	16 300	10 000	9 000
Total	17 540	17 425	16 515	10 594

See notes at end of table.

Table 9. - Production of Certain Fisheries Commodities by Specified Countries, 1946-49 (Continued)

Commodity and country	1946	1947	1948	1949
	(..... Metric tons a/.....)			
Salted herring and allied species h/				
Belgium	18 647	16 230	12 102	7 087
Canada	18 213	12 316	11 017	12 737
Newfoundland	29 897	15 063 i/	19 564 i/	5 858 i/
Denmark c/	4 100	4 100	3 700	2 000
Finland	6 500	6 000	4 000	4 000
France d/ i/	13 000	36 500	30 000	25 500
Iceland	20 900	8 359	11 480	12 900
Ireland	254	85	1 430	947
Italy	10 000	10 000*	10 000	12 108
Japan	139 100	69 750	44 935	193 358
Netherlands:				
Salted	45 000	58 000	74 000	60 000
Smoked	17 000	17 000	25 000	13 000
Norway	70 600	94 600	110 000	115 211
Philippines	1,546	3 884	1 608	1 266
Portugal	3 205	1 033	3 092	2 790
Sweden	17 761 j/	7 990 j/	23 819	...
United Kingdom: e/				
Salted	34 971	28 795	44 887	20 687
Smoked	59 226	66 460	69 599	54 087
United States of America f/	6 300*	6 300	6 300*	6 300
Total	516 220	462 465	506 533	...
Canned salmon				
Canada	29 404	33 300	28 511	31 264
Newfoundland	29	22	125	87
Denmark c/	40	40	30	50
Japan	300	188	24	165
United States of America f/	100 808	123 045	105 219	120 300
Total	130 581	156 595	133 909	151 866
Canned herring and allied species				
Belgium	3 036	2 643	979	1 046
Canada	38 980	44 569	19 873	8 199
Newfoundland	54	45	303	222
Chile	500*	568	671	1 864
Denmark c/	565	800	2 400	2 800
Finland	400	450	500	400
France d/	5 300	13 500	12 980	16 750
Ireland	100*	70	393	267
Italy	6 000	5 000*	4 000	4 427
Japan	650	563	817	4 060
Netherlands	2 800	4 000	4 500	5 000
Norway	24 900	34 600	41 100	35 000
Philippines	200*	204	149	1 192
Portugal	27 793	37 536	18 199	13 372
United Kingdom e/	5 080	6 990	10 571	14 380
United States of America f/	98 312	68 541	93 932	145 200
Venezuela	7 789	7 477	9 273	7 700*
Total	222 459	227 556	220 640	261 879
Canned tunas, true mackerels, and allied species				
Canada	2 100	1 707	1 312	660
Chile	700*	1 249	1 513	2 442
Denmark c/	480	1 070	1 500	3 000
France d/	7 550	7 100	10 980	14 900
Italy	4 300	6 750	3 000	1 332
Japan	875	488	313	749
Netherlands	125	350	160	700
Norway	410	1 510	620	290
Portugal	1 997	1 500*	1 527	2 211
United States of America f/	62 264 k/	74 834	89 530 k/	74 800
Total	80 801	96 558	110 455	101 084

Table 9. - Production of Certain Fisheries Commodities by Specified Countries, 1946-49 (Concluded)

Commodity and country	1946	1947	1948	1949
	(..... Metric tons a/.....)			
Cod-liver oil				
Belgium	66	98	88	94
Canada	1 597	1 388	1 433	1 322
Newfoundland	3 860	3 950	2 003	3 654
France d/	...	...	910	1 300
Iceland	6 200	7 500	8 970	8 500
Japan	100	375	325	611
Norway	10 100	11 700	7 200	7 800
United Kingdom e/	10 000*	11 298	10 000*	10 000*
United States of America f/	491	914	728	700
Total	...	...	31 657	33 981
Herring oil 1/				
Canada	4 039	5 639	12 025	11 883
Newfoundland	20	147	533	1 218
Chile	1 100	27	...	...
Iceland	17 500	31 801	17 450	7 565
Japan	3 400	2 250	817	1 545
Norway	14 700	22 400	42 200	26 600
United Kingdom e/	800*	762	483	1 829
United States of America f/	62 843	50 368	51 149	49 600
Total	104 402	113 394	...	...
Herring meal 1/				
Belgium	379	320	101	62
Canada	8 307	10 789	30 755	27 368
Newfoundland	166	933	953	1 044
Denmark c/	m/	m/	400	500
Finland	-	20	80	450
Iceland	17 550	33 975	22 900	7 700
Japan	8 200	3 375	8 170	14 610
Netherlands	m/	7 200	m/	m/
Norway	49 980	55 600	111 000	72 000
United States of America f/	138 842	122 479	127 897	137 400
Total	223 424	234 691	302 256	261 134
Other fish meal				
Belgium	295	369	633	590
Canada	12 712	11 503	9 973	12 701
Newfoundland	2 471	1 085	1 402	2 126
Denmark c/	3 555 m/	7 050 m/	11 200	11 450
Iceland	6 169 j/	5 467 j/	5 000	7 000
Japan	900	750	22 414	34 976
Netherlands	4 935 m/	690	5 800 m/	1 500 m/
Norway	8 600	16 400	13 500	12 700
United Kingdom e/	45 724 m/	50 513 m/	43 129 m/	51 706 m/
United States of America f/	36 199	40 985	47 029	60 700
Total	121 560	134 812	160 080	195 449

* Estimated.

a/ Product weight unless otherwise indicated.

b/ In 1946 and 1947 frozen fish is included with fresh fish for Italy, Netherlands, Newfoundland, Norway, and United Kingdom.

c/ Faroe Islands and Greenland not included.

d/ Continental France and Corsica only.

e/ England, Wales, and Scotland including Isle of Man, 1946-48. England, Wales, and Scotland, 1949.

f/ Including Alaska.

g/ Dried basis.

h/ Including smoked herring for some countries.

i/ Smoked herring is/or may be included.

j/ Exports.

k/ Including jack mackerel.

l/ Including allied species.

m/ Herring meal included with other fish meal.

Prices

During 1949, retail prices of canned tuna in the United States of America, the principal market for this product, declined substantially from the peak reached in 1948, but during the early part of 1950 prices remained relatively stable. Somewhat lower prices to the primary producers are reflected in the landings statistics from a number of countries. This tendency toward lower prices is still noticeable in the European markets and is believed to be due to a further increase in fish production and greater availability of other food at relatively reasonable prices, particularly in the United Kingdom and Germany.

The market outlook for vitamin oils (from cod liver, shark liver, etc.) is not promising. Fish meal apparently finds easy outlets particularly where payments are accepted in soft currency. Prices for herring oil dropped considerably during 1949 but prices have been fairly constant during 1950.

Relatively small landings of cod in Norway this year have intensified the competition between the various branches of fish processing to obtain as large a share of the raw material as possible. Prices paid to the fishermen, therefore, were sometimes considerably higher than the state guaranteed minimum prices.

As a result of declining prices and in the absence of a corresponding decline in operating costs, difficulties in sustaining profits and fishermen's recompense are reported from several countries. In one European country 1949 conditions were described as an economic storm. On 20 March 1950 Iceland devalued her currency to a rate of about 16 krónur to the U.S. dollar (compared with about 9 krónur after the devaluation last fall) in order to stimulate her fish export.

In South Africa the process of rapid growth that characterized the local fisheries during the past five years continued during 1949. New levels of output of canned fish and fish meal and oils were reached. In particular, the pilchard fisheries supplying the processing plants along the west coast of Cape Province continued to expand. It is considered that a stage has been reached which requires the consolidation of the gains and the growth of the industry.

The Embassy of Ceylon has requested that the last paragraph of their communication, which appears on page 49 of this issue read as follows:

> "Further particulars may be obtained from the Embassy of Ceylon, 2148 Wyoming Avenue, N. W. Washington, D. C. Applications for the above position should reach the Ambassador of Ceylon in Washington D. C., on or before August 31 1950."

Developments

INTRODUCING WORLD FISHERIES ABSTRACTS

There is a wide gap between the latest scientific and technical knowledge and the extent to which it is being put into use. This is particularly true in such fields as agriculture and fisheries, because here the primary producer or the processor is often a private individual or a small concern with few or no facilities for keeping constantly informed of the scientific and technical discoveries. This gap is considerable in the countries with the highest technical development, and it is much greater in other countries.

It is not enough to console oneself that the people concerned should keep informed through the technical and scientific literature. They seldom have access to it; they very seldom have time to read it all; and they certainly never would be able to remember all of it in order to make use of it at the time when actually needed.

Therefore, to be easily available, this information must be collected and condensed; and it must be accessible in as many languages as possible. It also must be prepared in such a way that every user can have the pertinent information at his fingertips whenever he needs it.

It is with this in mind that the Fisheries Division of FAO has started to publish World Fisheries Abstracts, a publication which will appear bimonthly.

This publication, to a large extent, follows a pattern set by Commerical Fisheries Abstracts, published by the Fish and Wildlife Service of the Department of the Interior of the United States of America.

Each issue of the FAO World Fisheries Abstracts contains approximately 63 summaries of the most important articles on technical questions appearing in the world fisheries literature. These summaries will not only inform the user that such articles have been published, but will also, to as high a degree as possible, give in a condensed form the actual information which each of them contains. In this way an abstract can be used without reference to the original. In addition, the abstract will give the full title, the name of the author, and the name and address of the publisher of the publication in which the item appeared. This is to enable the users to secure the original article whenever desired.

It often happens that identical or almost identical articles appear nearly simultaneously in several publications. This occurs, for instance, when a new type of equipment or process has been announced, and several periodicals base their articles on the same source. In such cases the abstract will refer to all articles which the editors have found. This is to make it easier for the user to locate one of the original articles, and also to let him know that certain articles which may occur under different headings have approximately the same content. In order to make this double reference system effective, the abstracts in World Fisheries Abstracts will be published three to six months after the appearance of the first of such articles.

By summarizing important technical articles from more than 125 publications, World Fisheries Abstracts will keep its users fully informed on the latest developments in fisheries technology. It will also review new books and other separate publications related to this field. Therefore, anyone interested in maintaining a reference library related to fisheries technology will be able to make his selections of books, etc., by following World Fisheries Abstracts. This will be very easy to do, as all abstracts concerning new publications are marked "New Publication." The abstract will give the address of the publisher and, if possible, the price of the publication, and other pertinent information.

The abstracts will be most useful when cut out and filed according to one of the three filing systems for which they are coded.

Since the usefulness of such a card file is entirely dependent on the ease with which the abstracts on a given subject can be found, a comprehensive subject list is contained in Handbook for World Fisheries Abstracts. Whenever information is needed, the user can consult this subject list, find code or classification word under which the information is filed and then consult only the cards with this code or word.

GREEK HYDROBIOLOGICAL INSTITUTE

The Greek Hydrobiological Institute, founded in 1945 at Piraeus, acts as the scientific arm of the Fisheries Service, an agency of the Ministry of National Economy. The work of the Institute really began in 1949 when larger appropriations were made available; until that time it was unable to obtain sufficient funds to undertake investigations.

The Institute started out with a headquarters building at Piraeus, and one research vessel. A second research vessel, equipped for experimental fishing was later provided by UNRRA. The Institute has now taken over the biological station at Rhodes, and is in the process of setting up other research stations in various parts of the country. One such station has been established at Salonika, and an observation center has been set up on the Island of Crete.

The appropriations granted to the Institute in 1949 permitted the completion of the biological and chemical laboratories at Piraeus, repairs to one of the research vessels, and the placing of orders for instruments and equipment.

Investigations carried on in 1949 included an examination of the effects of different methods of fishing on stocks of fish; an examination of catch statistics by area and time; and studies of hydrological conditions and characteristics of the sea bottom in the Northern Sporades, southeast of Euboea and near Hydra, to discover new fishing grounds.

In addition to its scientific work, the Institute is assuming responsibilities in the education field. One of the research vessels showed films to fishermen in remote fishing centers during the course of its investigations in 1949.

The over-all program of research is directed toward the development and management of the fisheries resources of Greece. Much of the work is concerned with exploratory

and experimental fishing. Biological investigations designed to study the life histories and dynamics of the commercially important species yield information which will be used to formulate scientifically sound fishing regulations in order to carry on proper management practices.

FRESH-WATER FISHERIES RESEARCH IN SWEDEN

The Institute of Fresh-Water Research, with headquarters at Drottningholm, Stockholm, Sweden, was founded in 1932 and was originally known as the Swedish State Institute of Fresh-Water Fishery Research. The Institute was at first under the Fishery Bureau of the Board of Agriculture, but in July 1948, when the Fishery Board of Sweden was established, the Institute came under its jurisdiction. It now carries on fresh-water fishery research for the Board, under the supervision of its own director.

The 1948 annual report 1/ of the Institute of Fresh-Water Research states that the general aim of its work is to investigate the possibilities of increasing the yield of fish in the lakes and rivers of Sweden. The director outlines the various investigations which are now in progress and which are designed to obtain information on such possibilities.

The yield of lakes is mainly determined by the supply of suitable fish food which in turn depends on the general productivity of the lakes. For this reason, the Institute concentrated on investigations on the bottom and plankton fauna and its importance as fish food. Investigations of the bottom fauna were begun in 1942, in the Aneboda-Växjö sector. Special attention was paid to the chironomids which are the most important group of bottom animals in Swedish lakes, and an attempt was made to find out how the humus factor influences the bottom fauna qualitatively as well as quantitatively. A survey of the general results of the lake investigations was published in 1949 as Report No. 30 (Fishery Board of Sweden). Investigations have also been made on the plankton production in certain parts of the water system of Indalsälven in Jämtland.

In connection with investigations on the biology of different species of fish, large numbers of fish stomachs have been collected, which give a general idea of the food of these fishes. Sufficient information is thought to be available to demonstrate the supply of food available and how this supply is utilized. This work, it is hoped, will make it possible to judge the possibility of exploiting the fish food production of the lakes by suitable combinations of fish stocks, and thus obtain an optimal production of fish.

The many small lakes in the Province of Jämtland, which were considered unproductive, are being stocked by introducing char (Salvelinus alpinus), trout (Salmo trutta), and whitefish (Coregonus lavaretus). These plantings are showing good results.

There are a great many hatcheries in Sweden from which millions of fry, principally pike (Esox lucius) and whitefish, are planted. The Institute is carrying on experiments to determine the effectiveness of this extensive program of artificial propagation. To find out whether the program is increasing fish production and whether it is economically profitable, the Institute is varying plantings, conducting marketing experiments, and collecting catch statistics. Controlled experiments are being

1/ Institute of Fresh-Water Research (Drottningholm), Annual Report for the Year 1948 and Short Papers (Report No. 29, Fishery Board of Sweden), Lund, Sweden, 1949.

undertaken in some streams to measure the returns from both natural propagation and plantings.

Investigations are being carried on at several lakes, which have been impounded, to determine what effect raising the water level and controlling the run-off during the spring flood season has on fish populations and their food supply.

Attempts are also being made to find suitable measures to compensate for the damaging effects of hydroelectric dams on salmon populations.

THREE NEW INTERNATIONAL FISHERIES COMMISSIONS

Many countries have been aware for some time of the need for joint action in the conservation of marine fisheries resources, but international conventions for this purpose are a relatively new instrument in international relations. As some of the great fisheries of the world are those of the high seas and can be exploited by more than one nation, the rational exploitation of these resources can best be handled on the basis of international collaboration.

One effective means of obtaining such collaboration is the international commission developed by Canada and the United States of America. These countries have two such bodies, the International Fisheries Commission, established by a treaty signed in 1923, for the preservation and development of the halibut fishery of the North Pacific, and the International Pacific Salmon Fisheries Commission, formed by the convention of 1937 for the protection, preservation, and extension of the sockeye salmon fisheries of the Fraser River system.

The past year has seen the goundwork laid for the establishment of three new international fisheries commissions. This development has been brought about because the governments and fishing industries concerned realize the fisheries resources affected can at times best be rationally exploited and developed through international cooperation. The remarkable success of the Halibut Commission in rehabilitating the once depleted Pacific halibut fishery and the promising work of the Salmon Commission with the sockeye salmon have probably had some influence on the extension of this type of operation. The resources and areas embraced by the new commissions lie off the coasts of North America and Central America and in the Northwest Atlantic.

The two new fisheries commissions on the Pacific coast are the International Commission for the Scientific Investigation of Tuna and the Inter-American Tropical Tuna Commission.

The International Commission for the Scientific Investigation of Tuna resulted from a convention between the United States of America and Mexico, which was signed in January 1949 and for which ratification is shortly expected. The Commission will be composed of two national sections of four members each who are expected to be appointed shortly by their respective governments. These eight nonpaid commissioners will be responsible for the policies of the commission, and they will appoint a director and staff for the performance of the commission's functions.

The convention provides that the commission will engage in the scientific

investigations of the tuna and tuna-like fishes of the eastern Pacific Ocean, as well as those species of fish which are used for bait in the tuna fisheries. The information obtained will be used to facilitate maintaining the populations of these fishes at a level which will permit the maximum reasonable utilization without depletion year after year. The convention does not provide for regulatory powers. Presumably the two governments will each formulate the regulations governing their respective nationals on the basis of the scientific data provided by the Commission.

The Inter-American Tropical Tuna Commission was established by a convention between Costa Rica and the United States of America, which was signed in May 1949 and ratified in March 1950. It is essentially similar to the United States-Mexican agreement but also differs in some respects. The commission will be composed of two national sections, each consisting of from one to four members appointed by the respective governments.

The commission is empowered to undertake the scientific investigations of the yellowfin (Neothunnus sp.) and skipjack (Katsuwonus sp.) tuna and bait fishes in the eastern Pacific Ocean in the fisheries maintained by the nationals of the two countries. Other kinds of fish taken by tuna fishing vessels may also be studied by the Commission.

The agreement between Costa Rica and the United States of America covers particularly the tuna fisheries in the tropical waters of the eastern Pacific Ocean. Unlike the fisheries concerned in the United States-Mexican convention, the fisheries included in this agreement are also of interest to a number of countries besides the signatories. Accordingly, the convention has a provision whereby any of these nations may become a party to the agreement.

The International Commission for the Northwest Atlantic Fisheries will come into existence upon the ratification by any four governments of the convention drawn up by ten nations in February 1949. The signatories were Canada, Denmark, France, Iceland, Italy, Norway, Portugal, Spain, the United Kingdom, and the United States of America.

The over-all area covered by the convention is divided into five subareas which cover the waters off Labrador, Newfoundland, Nova Scotia, the New England states, and the west coast of Greenland. The agreement provides for a commission on which each contracting government will be represented by not more than three commissioners. There will be separate panels with particular jurisdiction over each of the subareas. The panels will be composed of contracting governments with particular fishing interests in each subarea.

The primary function of the commission will be to collect, collate, and disseminate scientific information on international fisheries in the convention area. Although provision is made for the commission's staff to carry on scientific investigations, it is intended that the fisheries research programs in the areas be continued by the individual countries.

While the commission will have no direct regulatory powers, any panel may transmit through the commission to the governments of such panel for appropriate action recommendations for measures based upon scientific information which are deemed necessary for maintaining those stocks of fish which support international fisheries in the convention area. Within a specified time after action has been taken by the panel governments of each subarea affected, such measure will become applicable to all contracting governments.

FISHERIES INVESTIGATIONS IN UNGAVA BAY, NORTHEAST CANADA

For the past three summers, the Fisheries Research Board of Canada has been studying the biological and physical oceanography of Ungava Bay and investigating the marine resources which may be developed by the Eskimos in this area of the Eastern Arctic. The work will be continued during the summer of 1950. The Fisheries Department Trade News (Vol. 2, No. 5, November 1949), published by the Canadian Department of Fisheries, summarizes the findings of the party of five scientists who were aboard the fisheries research vessel "Calames" carrying on these investigations during two summer months of 1949. The vessel was built especially for the Arctic investigations, having been launched in Nova Scotia in the summer of 1948.

From the experimental fishing, it was found that cod were abundant in the Port Burwell area on the west coast of Killinek Island early in August. Codfish were also found to be plentiful at the mouth of Foxe Harbor and in Forbes Sound, both to the south of Port Burwell. Although it was not established, the party believes that cod are possibly fairly uniformly abundant close to the rocky shore of the whole Killinek Island.

Fish described as "cod" were reported common in Acadia Cove, and in the Resolution Island group, some 40 miles north of Buttons. However, cod jigging produced no results in these places. The cod in Acadia Cove are caught for consumption by the personnel of the radio station there. It has not yet been ascertained whether these fish are of the same species as those occurring around Killinek Island.

The report states that there is no doubt that the Greenland shark (Somniosus microcephalus) can be developed into a valuable resource for the Eskimos, providing instructions are given in methods of fishing and in ways of preparing the meat and skins, and providing marketing facilities for the skins are made available.

The investigations have, thus far, demonstrated that hand lining is the only successful method of fishing in Ungava Bay. Otter trawling was not successful because of the uneven and rocky nature of the bottom. Over the areas explored (the Burwell region, and the area between Payne Bay and Akpatok Island), the mud or sandy mud appeared to be in crevices and small valleys in an otherwise rocky and broken terrain. From the explorations made with the echo sounder, this type of bottom probably extends over the whole of Ungava Bay.

Although the echo sounder and dredge offered little promise of suitable trawling bottom, the otter trawl was used at four stations in Forbes Sound and outside. Damage to the net was considerable. Between Payne Bay and Akpatok Island, the flounder drag (an otter trawl) was similarly torn; even the canvas used to protect the bottom of the net was ripped beyond repair. Since use of the trawl was impracticable, little information was obtained on the presence and abundance of groundfish and shrimp.

Long-line fishing was tried persistently during the three summer investigations without success. Lines laid in areas and depths in which cod were caught in large numbers with hand lines (jigging) failed to catch either cod or sharks. The guts and meat of sculpin and cod were used as bait. It appears that the behavior of the cod in the cold waters of Ungava Bay is significantly different from that in more southern waters, or in West Greenland, where long-line fishing for cod is successful.

For the oceanographic work, 16 hydrographic stations were occupied for purposes of physical oceanography, and sections were made from Port Burwell to Akpatok Island,

Akpatok Island to Payne Bay and from Akpatok Island to the mouth of the Koksoak River. Eighty-three water samples were taken at various depths. During the plankton hauls, particular attention was paid to the deeper water layers. As a result of the 1949 work and that in previous seasons, there is material on hand for a full account of the plankton of Ungava Bay.

Since trawling and long lining failed, it was difficult to obtain undamaged specimens of cod for marking experiments. Despite the fact that the barbs were filed off the jigs, many of the cod taken for this purpose were damaged so severely as to be useless for tagging. For this reason, only a total of 88 cod were tagged, and it is doubtful if returns will be obtained from such a small number.

RESEARCH PROJECTS EXAMINE FLUCTUATING SARDINE POPULATIONS

The three great sardine fisheries of the world were developed off the coasts of Japan, the United States of America, and Portugal and Spain during the first half of the twentieth century. Although these fisheries operate on three different species, their pattern of development has been similar, and now they are faced with a common problem - a decided drop in the sardine catch.

Production of the Japanese and Korean sardine (Sardinella melanosticta) fisheries began insignificantly at the turn of the century, reached a peak in 1933, and remained remarkably stable until around 1941 when there was a sudden disappearance of the species. The United States fishery for the species Sardinops caerulea, which is centered along the coast of California, began its rapid expansion during World War I and reached its peak in 1936. Thereafter, the sardine catch remained fairly stable through 1944, after which a rapid decline began. Landing statistics for Portugal are available from 1934 and show that sardine (Clupea pilchardus) production continued at a fairly high level through World War II, but during 1947 and 1948 the fish appeared in much smaller quantities. Similar conditions occurred in the Spanish fishery.

Various government agencies and private institutions of the countries affected by the declining sardine populations have done considerable research on the problem, but there is yet insufficient information available to ascertain the causes for the sudden drops in abundance or changes in availability of these stocks.

The Japanese have placed great emphasis on oceanographic and hydrographic studies and have, upon occasion, predicted the appearance and location of the sardine on the basis of oceanographic data. They have also given some attention to developing a "catch per unit of effort" index. Here, the investigators concluded that changes in the index were correlated with changes in temperature rather than abundance. As a result, their studies have been concentrated on the relation between temperature changes and availability of the sardine. In the past, the Japanese have paid little attention to gaining an understanding of the dynamics of the sardine populations; that is, a knowledge of the relationship between recruitment and growth, and fishing and natural mortality.

Investigations undertaken in Spain and Portugal have also placed most of the emphasis on oceanographic conditions together with biometric studies. Here also, the problem of the dynamics of the sardine populations has received little attention.

The sardine research programs on the west coast of the United States have, in the past, paid only limited attention to oceanographic investigations. Work has been primarily devoted to tagging or marking experiments, "catch per unit of effort" studies, age studies, and egg and larval investigations.

It is generally recognized that more intense studies are necessary in order both to explain satisfactorily changes in abundance of the sardine and to obtain a basis for sound management practices. An extensive program is now under way in California which is designed to secure this essential information for that fishery. The research program is being conducted by several organizations but the over-all program is being co-ordinated by the Marine Research Committee.

The research program of the four organizations participating in the work is financed by the United States Federal Government, the Government of the State of California, and the fishing industry. In 1947, the California sardine industry voluntarily added 50 cents per ton to its tax to provide additional funds for research. The latter fund is administered by the Marine Research Committee, composed of five members from the fishing industry, three from the California Division of Fish and Game, and one from the public at large. The research program is co-ordinated by the Marine Research Committee and its Technical Advisory Committee. The advisory committee is composed of the directors of the co-operating agencies, the Bureau of Marine Fisheries of the California Division of Fish and Game, the Scripps Institute of Oceanography of the University of California, the United States Fish and Wildlife Service (Chief, South Pacific Investigations), and the California Academy of Sciences.

The over-all aim of the sardine investigation is to study the life history, population dynamics and environmental factors affecting these populations, and from these to obtain a basis for predicting the optimum catches available to the fishermen each year. The program of research got under way in 1949 with each of the agencies being assigned different projects as follows:

California Bureau of Marine Fisheries

1. Measurement of abundance before fish enter the fishery;
2. Availability, abundance, distribution, and migration (Also United States Fish and Wildlife Service);
3. Fishing methods in relation to availability.

United States Fish and Wildlife Service

1. Success of spawning and recruitment;
2. Availability, abundance, distribution, and migration (Also California Bureau of Marine Fisheries).

Scripps Institution of Oceanography

1. Physical and chemical conditions of the sea;
2. Organic productivity of the sea and its utilization.

California Academy of Sciences

1. Physiology and behavior.

During 1949, three vessels of the Scripps Institution of Oceanography, two from the California Bureau of Marine Fisheries on a part-time basis, and one from the Fish and Wildlife Service conducted investigations along the west coast, from Oregon to southern Mexico. The initial work of the Fish and Wildlife Service in investigating factors affecting the success of spawning involved spawning ground surveys. This agency decided that before conducting intense surveys, it was first necessary to know where and when the sardines spawn. As previous spawning surveys were of a fragmentary nature, the work in 1949 was directed mainly toward determining the extent and time of spawning of the sardine.

The spawning season commenced in March and extended through July with two areas of major importance. One area was to the south of Cedros Island, which is off the coast of Mexico, and the other off southern California. Both areas of heavy spawning are in areas of upwelling. Upwelled water appeared to be important, not only because of the enrichment associated with upwelling, but also because the temperature of the water is more likely to be favorable. A correlation was found between time of spawning and water temperature. All spawning during the 1949 season occurred in water between 13.3° C. and 16.2° C.

SHARK INDUSTRY SUGGESTED FOR TRINIDAD

During April and May 1949 a fishing vessel operated by Shark Industries (Stuart, Florida, U.S.A.) fished for sharks off the coasts of Trinidad and Tobago in the West Indies. Results of the venture indicate that there are good possibilities for establishing a shark fishery in this region.

Information on the expedition is contained in a paper by Stewart Springer to be published in the 1949 Proceedings of the Gulf and Caribbean Fisheries Institute and some of the findings and recommendations are summarized below:

-- The concentration is not high but sharks are more evenly and generally distributed than in more norther waters.

-- Twenty-four species are known to occur in the area. These vary widely in commercial value, and identification of the species is therefore important in developing a fishery.

-- Long lines caught more sharks than gill nets, especially in the offshore water where the currents are too strong for the latter. However, gill nets can be used in the inshore waters and should prove satisfactory for small boats operating in these waters.

-- The livers taken during the fishing operations had a wide range of vitamin A potency, ranging in single livers from 500 to 50,000 international units per gram.

-- The hides of several of the larger species have a substantial market value. It was pointed out, however, that during the rainy season there may be enough fresh water entering the Gulf of Paria to have an adverse effect on the quality of shark hides taken at that time.

-- In developing a shark fishery it is important for the catch to be fully utilized, and one of the first objectives should be the introduction of a process for preparing a good dried salt shark meat. The shark fins are of good quality and should have a ready market. The waste after the liver, hide, and fins are removed can be made into shark meal with a protein content as high as 80 percent.

-- It was recommended that the shark fishery in Trinidad be organized in a similar manner to the one in Cuba. The Cuban fishery chiefly employs 15 to 18 foot heavy rowboats. About 75 percent of the catch is taken with hand lines, and the remainder is taken with long lines and gill nets. Cubans make wide use of the various products obtained from the shark.

CANADIAN OCEANOGRAPHIC PROGRAM*

The Canadian Joint Committee on Oceanography was set up in 1946 to further co-operative research in Canada and to direct, through the Chief Oceanographer, the work of the Atlantic and Pacific Oceanographic Groups, located respectively at the Atlantic Biological Station at St. Andrews, New Brunswick, and at the Pacific Biological Station at Nanaimo, British Columbia, both of the Fisheries Research Board of Canada.

While the co-operating organizations are cognizant of the many oceanographic problems requiring early attention, in the fundamental as well as applied fields of oceanographic research, it is visualized that one of the main difficulties to be overcome is the lack of trained personnel in the physical and chemical aspects of the subject. Possibilities for the immediate future, however, are much brighter. The Fisheries Research Board of Canada, the National Research Council, the Hydrographic Service of the Department of Mines and Resources, and the Naval Research Establishments of the Defence Research Board are gradually obtaining additional qualified personnel with interests in various phases of oceanography, and the newly established Institute of Oceanography at the University of British Columbia now serves to direct the interest of some students of various faculties towards the field of oceanography.

The efforts of the Joint Committee on the Atlantic Coast have resulted in excellent co-operation among the National Research Council, the Fisheries Research Board, the Naval Research Establishment, and the Hydrographic Service. On the West Coast, the Fisheries Research Board, the Pacific Naval Laboratory and the United States Naval Electronics Laboratory have co-operated in several large field expeditions. In addition, close liaison is maintained with the Royal Canadian Navy, and the Meteorological Service, and such organizations as the Labrador Expedition sponsored by the Arctic Institute of North America and the Arctic work of the Fisheries Research Board.

As yet, the planning of field work on both coasts offers considerable difficulty due to shortage of personnel mentioned and the uncertainty concerning the availability of ships. However, a definite improvement is in sight for this year, and it is evident that the pooling of personnel and services by the various co-operating organizations is soon to provide the means of giving greater attention to the many problems of the ocean.

* Reprinted from Fisheries Department Trade News, Vol. 2, No. 7 (January 1950), pp. 35-36, Ottawa, Canada, 1950.

The Atlantic Oceanographic Group: During 1949, with the co-operation of the Hydrographic Service, four major vessels have been equipped with necessary equipment for making temperature observations and collecting water samples. Two of these ships made oceanographic observations as the opportunity offered during the past season, in the Gulf of St. Lawrence and on the south and east coasts of Newfoundland, and it is expected that all four ships will contribute to the collection of data in 1950.

In co-operation with the Naval Research Establishment, cruises off the Scotian Shelf were made in February, March, October, and November. A partial cruise of the Gulf of St. Lawrence was also completed in November. In co-operation with the Atlantic Herring Investigation Committee, a survey of water conditions on the Bay of Islands on the west coast of Newfoundland was made in November.

Ships of the Royal Canadian Navy continue to contribute to the Committee's library of oceanographic data. One ship, in particular, turned in temperature data giving good winter coverage of most of the fishing banks between Halifax and Boston.

The Pacific Oceanographic Group: With the oceanographic interests developing at the University of British Columbia, it is expected that trained and interested personnel will gradually become available for the further development of oceanographic work on the Pacific coast.

The Group took part in the joint United States Navy - Royal Canadian Navy research operation in waters off the Aleutian Islands during July, August, and September, accepting the responsibility for the oceanographic survey of these regions. Reports are in preparation on oceanographical features of Georgia Strait, Nodales Channel, and the Skeena estuary.

SILVERSIDE (PEJERREY) CULTURE IN ARGENTINA 1/

A species of silverside (Odonthestes bonariensis) is the principal commercial fresh-water fish in Argentina. Known as the "pejerrey," this species has a palatable flesh and is of high commercial value in the fish markets where it is greatly in demand.

Pejerrey production in 1928 was 2,600 metric tons but the yield dropped after that time, reaching a low of 750 metric tons in 1940. This continuous drop in production has prompted the Bureau of Fish Culture, Marine Fisheries and Hunting (Dirección de Piscicultura, Pesca y Caza) to embark on a project to establish a network of hatcheries throughout Argentina for the artificial propagation of this valuable species.

1/ Tomas G. Regalado and Vicente Mastrarrigo, El Pejerrey (Dirección de Informaciones, Publicación Miscelánea No. 268, Piscicultura), Ministerio de Agricultura de la Nación, Buenos Aires, Argentina, 1948.
Tomas L. Marini, La Pesca y la Piscicultura, fuentes inexplotadas de riqueza en la República Argentina, Ministerio de Agricultura de la Nación, Buenos Aires, Argentina, 1941.

The pejerrey readily adapts itself to different environmental conditions and grows successfully in both large lakes and small ponds. Under favorable conditions and systematic and intensive rearing, 150 kilograms per hectare can be produced yearly.

At the present time the Bureau maintains a well-organized fish culture and distribution service for the pejerrey. By 1948, a total of 25,000 hectares of water, mostly larger lake areas, had been stocked with this species. The first culture work was initiated at Lake Chascomus in Buenos Aires Province and later extended to Lake Embalse in Cordoba Province. A hatchery at the latter site now provides the eggs and young for the stocking and planting purposes. In 1941, Lake Embalse hatchery annually produced more than 15 million fertilized eggs, the eggs being taken from fish caught in this lake during the spawning season. In addition, the lake could yield 300 to 400 metric tons of this fish annually.

The following procedures are followed at the Lake Embalse hatchery for the artificial propagation of the pejerrey. The fertilized eggs are reared in special glass jars, each with a capacity of approximately 40,000 eggs. From this hatchery, eyed eggs and young fish in various stages of development are distributed throughout the country. Fertilized eggs are transported in special insulated containers in which the air is kept moist and the temperature at about 14° C. The eggs may be kept in transit for a period of 24 hours. The fry are distributed in various types of cans.

RED SNAPPER GROUNDS DISCOVERED OFF COAST OF INDIA

The discovery of red snapper (Lutjanus sp.) grounds about 100 miles offshore from Ratnagiri in Bombay Province offers potentialities for the development of line fishing in this area.[1/] Preliminary surveys reveal that these grounds are extensive and that there must be equally rich fishing banks elsewhere along the coast. Such distant areas have not been fished because they are beyond the reach of the sailboats used in Bombay fisheries, and because the few fishermen with powered craft are reluctant to operate individually that far offshore.

The development of line fishing in the offshore waters would be advantageous, and it is thought that a beginning can be made if existing powered craft will work in teams. It is not expected that an offshore snapper fishery will develop rapidly, for there are not sufficient powered fishing craft available. Sailboats are not suitable; it has been found in the line fishing practiced extensively along the coast that the catches have been unsatisfactory since the sailboats cannot operate far offshore, are unable to handle a sufficient number of hooks, and cannot return to port quickly. Trawlers, purse seiners, and other mechanized vessels are being imported in small numbers, but it will be a long time before they are in general use as they require skilled operators and capital investment beyond the means of the average fisherman. At present, the paramount problem is the accelerated mechanization of the existing sailing vessels.

1/ S. B. Setna, "Bombay Fishermen's Ingenuity," The Journal of the Bombay Natural History Society (Bombay, India), Volume 48, No. 3, pp. 444-453, August 1949.

Fisheries Division Activities

● The Chief of the Fisheries Biological Branch, Dr. J. L. Kask, visited Haiti in early April following a request from the Haitian Government to the United Nations for assistance in the development of fish farming.

The Report of the United Nations Mission to the Republic of Haiti has the following to say on fish culture: "Since fish culture in ponds seems the only means capable of expanding the supply of fish from local resources (as distinct from supplies obtained through import) to a volume reasonably close to total consumption requirements, the Government should give full consideration to the feasibility of developing pond culture on an intensive scale ..." The Mission recommended that a thorough survey of the possibilities for fish farming be made by a first-rate specialist familiar with successful practices in other countries who may organize pilot operations and train local men in the principles of fish culture.

The Haitian Government now wishes to initiate a fish farming project in connection with the land reclamation activities of SCIPA (Service coopératif inter-américain de production agricole) in the Artibonite Valley. Here there are irrigation canals, rice paddies, natural lakes, wasteland areas where ponds can be made, marshes and mangrove swamps, all of which can be utilized and developed for fish culture. Mr. S.Y.Lin of the Biological Branch will spend a month or two in Haiti to get the project under way and to supervise it until more permanent arrangements can be made for the employment of personnel.

● The Chief of the Technological Branch, Mr. Mogens Jul, visited several European countries early in 1950 and discussed with fisheries officials the proposed meeting on technical problems of the herring industry recommended by the FAO-sponsored herring meeting held in The Hague in the fall of 1949. The officials consulted felt that there was need for an exchange of information and discussion amongst fish processing technologists, not only on the various problems connected with herring, but also on the handling and processing of other fish. In addition, many officials expressed an interest in periodic conferences of fish processing technologists and suggested that this be discussed at the forthcoming meeting. Accordingly, a meeting to consider the technological aspects of heering processing, etc., is now being called and will take place in Bergen, Norway, 24 to 29 September 1950. Persons interested in attending the meeting should contact their respective governments.

● Further nominations of membership on the two interim committees on oceanography and fisheries technology of the proposed General Fisheries Council for the Mediterranean have been received. These are: Lebanon: Edmond Donato (oceanography and technology); United Kingdom: C. F. Hickling (oceanography); and Yugoslavia: Tonko Soljan (oceanography and technology).

Notes on Publications

Problems in Enumeration of Populations of Spawning Sockeye Salmon. Bulletin II, International Pacific Salmon Fisheries Commission, New Westminster, British Columbia, Canada, 1948. 85 pp. In English.

One of the first problems encountered by the International Pacific Salmon Fisheries Commission was the development of a method of determining the numbers of sockeye salmon spawning in the different tributaries of the Fraser River. The first of two papers in this bulletin, entitled "A Study of the Tagging Method in the Enumeration of Sockeye Salmon Populations," deals with controlled experiments conducted for the purpose of determining the feasibility of estimating the size of a population by tagging a portion of the migrants as they moved to the spawning area and later sampling the population on the grounds. The extensive statistical treatment of the data gives information on the accuracy of the tagging method for enumeration purposes. The second paper, "A Mathematical Study of Confidence Limits of Salmon Populations Calculated from Sample Tag Ratios," is devoted to the mathematical background used to calculate limits of confidence for populations obtained from marking programs. It demonstrates that one common method developed for calculating confidence limits is unsound and that two others used often give results which are too asymmetrical. Based upon the thesis of random sampling, the author develops a new solution and clarifies many points by defining the conditions under which different methods for determining confidence limits should be used.

Preliminary Fisheries Survey of the Hawaiian Islands Area, Part I - The Hawaiian Long-Line Fishery. Fred C. June. Commercial Fisheries Review, Vol. 12, No. 1 (January 1950), pp. 1-23. United States Department of the Interior, Fish and Wildlife Service, Washington, D. C., 1950. In English.

This is Part I of a report presenting the data obtained during a six-month survey undertaken for the purpose of gathering information on the tunas and tuna bait fishes of the Hawaiian-Line Islands region, to be used in planning the operations of the Pacific Oceanic Fishery Investigations' research and exploratory fishing vessels in the waters of the tropical and subtropical central Pacific Ocean. Subject matter in the paper includes Hawaiian landings of the tuna species, description of the long-line boat, description of the long-line gear, type of bait used, catching of bait fishes, setting the long-line gear, operation of the long-line gear, areas of fishing, duration of fishing, amount and efficiency of the gear fished, and catch composition.

Fisheries in Burma. U Khin. Government of the Union of Burma, Rangoon, Burma, 1948. iii + 180 + iii pp., 40 pl. In English.

The report includes information on the fisheries of Burma and similar data for the Madras Presidency, the Bombay Presidency, and Bengal. Chapter headings dealing with Burma are: Food Fishes; Inland Fisheries; Methods of Working Inland

Fisheries; Marine Fisheries; Pisciculture; Marketing of Fish and Fish Products; Fisheries in Relation to Agricultural and Other Interests; Fishery Legislation and Administration; Research and Statistics. Appendices give a list of the important food fishes of Burma, taxonomic information, supplementary information dealing with Bombay, Bengal, and Madras, a glossary of Burmese words and a bibliography of 35 papers. The report describes the fishing industry as it existed in Burma prior to the Japanese occupation, and also the possible lines of its future development.

Bibliographie analytique des publications de l'Office scientifique et technique des pêches maritimes (Analytical Bibliography of the Publications of the Scientific and Technical Office of Marine Fisheries). Notes et rapports (Nouvelle série) No. 3. Office scientifique et technique des pêches maritimes, Paris, France. July 1948. 72 pp. In French.

This is a complete bibliography of the publications issued by the Office scientifique et technique des pêches maritimes of France since its establishment in 1921 until 1948. It is organized in two parts. In the first part the papers are listed alphabetically by author and in the second, by subject.

Pearl Culture in Japan. A. R. Cahn. Fishery Leaflet 357. United States Department of the Interior, Fish and Wildlife Service, Washington, D. C., U.S.A. November 1949. 91 pp., 23 figs. In English.

The different aspects of the pearl culture and pearl industry in Japan are discussed under the following subject headings: History of Pearl Culture in Japan and in the South Pacific Areas, The Species of Pearl Oyster and Their Distribution, Biology of the Pearl Oyster, Histology and Functions of the Mantle, Development of the Pearl, Pearl Oyster Culture, The Pearl, By-products, Organization of a Pearl Farm, Control of the Industry, Statistics of Production and Fresh-Water Pearl Culture. Illustrations, maps, and charts are included. A glossary of technical terms and conversion factors are given together with appendices on the patents of pearl and pearl oyster culture.

A Symposium on Fish Populations. Bulletin of the Bingham Oceanographic Collection, Peabody Museum of Natural History, Yale University, Vol. II, Article 4. The Bingham Oceanographic Laboratory, New Haven, Connecticut, U.S.A., May 1948. 283 pp. In English.

The bulletin contains nine papers presented at a symposium on fish populations held at the Royal Ontario Museum of Zoology, Toronto, Canada, early in January 1947. Following each paper is a verbatim record of the discussion which ensued after the presentation. The papers discuss many of the factors affecting commercial fish populations, such as fishing intensity, mortality rates, and natural fluctuations, and also express views on the prospects of proper management. The authors are among the better known fishery investigators in North America.

Japanese Whaling Industry Prior to 1946. William M. Terry. General Headquarters Supreme Commander for the Allied Powers, Natural Resources Section Report No. 126, Tokyo, Japan, 1950. 47 pp. In English.

The purpose of this publication is "the collection and presentation of available data on the history of systematic Japanese whaling operations prior to and during World War II." The author warns that the statistics available are not completely reliable and that caution should therefore be exercised in the use of the data. The text deals with pelagic whaling in Antarctic and northern waters, coastal and colonial whaling, and the organization and regulation of the industry. The statistical data present, inter alia, for the years 1934-41, the composition of Japanese Antarctic whaling fleets, the whale catch, and the products of Japanese Antarctic whaling. The coastal and colonial whale catch is given for 1911-45.

Fortegnelse over Merkepliktige Norske Fiskefarkoster 1948 (Registry of Norwegian Fishing Craft, 1948). Fiskeridirektøren. A/S Lunde and Co., Bergen, Norway, 1948. xvi + 951 + 26 pp. In Norwegian.

The 1948 registry follows the same general pattern as previous issues, but much of the material has been radically revised. The registry now contains information on 32,970 Norwegian fishing craft, brought up to date to 15 April 1948. The registry continues to give the following information for each craft: identification number, name, principal employment of craft, construction material, construction year for hull, length of hull, beam, depth, make of engine, horsepower, number of catching boats attached to the craft, and the name and address of owner. In addition, this issue includes the year of manufacture of engine.

Refrigerated Locker Storage of Fish and Shellfish. Fishery Leaflet 128. United States Department of the Interior, Fish and Wildlife Service, Washington, D.C., U.S.A. Revised June 1949. 20 pp. In English.

This leaflet has been prepared primarily for the information of people who use home freezing or frozen food lockers. It gives very detailed instructions regarding procurement of fish and methods for preparation, packaging, freezing, storage, and cooking.

Fiskerilitteratur 1948 (Fisheries Literature 1948). Einar Koefoed and Margit Monstad. Fiskeridirektoren, Aarsberetning vedkommende Norges Fiskerier, 1948, No. 4. Cammermeyers Boghandel, Oslo, Norway, 1949. 76 pp. In Norwegian.

This publication contains bibliographical references to various periodicals and books received by the Norwegian Fisheries Department. References to articles in such publications are arranged according to subjects. The entries are indexed by author and title.

Linseed Oil as a Treatment for Linen Gill Nets. B. Farrar. Technical Bulletin No. 6, British Columbia Research Council, Vancouver, B.C., Canada. 1947. 33 pp. In English.

The advantages and disadvantages of the linseed-oil treatment as claimed by fishermen, net men, etc., have been checked by field observations and field and laboratory tests. It is considered possible to minimize some of the serious disadvantages by making changes in the methods of application of the oil.

Studies on the Preservation of Fish Nets. B. Farrar. Technical Bulletin No. 11. British Columbia Research Council, Vancouver, B.C., Canada. 1948. 32 pp. 64 tables. In English.

The studies include an evaluation based on actual operating conditions of the effectiveness of various known preservative compounds; a critical examination of the effects of winter storage and weathering on the life of fishing gear; and recommendations regarding proper care and treatment of the gear.

The bulletin gives information on the effectiveness of newly developed preservative treatments, which were also tested, as well as on the resistance of new types of fibers to rapid deterioration.

It is suggested that the specifications for twines and nets should be standardized.

Renholdets betydning for fisk og fiskevarers kvalitet. (Importance of Sanitation for the Quality of Fish and Fishery Products). Olav Notevarp and Sverre Hjorth-Hansen. Fiskeridirektoratets Smaaskrifter No. 1, 1943, 15 pp. Ferskfiskens behandling (Handling of Fresh Fish). Olav Notevarp and Sverre Hjorth-Hansen. Fiskeridirektoratets Smaaskrifter No. 2, 1949. 7 pp. A. S. John Griegs Boktrykkeri, Bergen, Norway. In Norwegian.

These pamphlets are intended for information of fishermen and the fishing trade. They outline the various precautions which should be taken to avoid contamination of fresh fish and to obtain the maximum keeping quality.

Biological Report No. 49A. State of Washington Department of Fisheries, Seattle, Washington, U.S.A., April 1949. 211 pp., illus., tables. In English.

The present issue contains six scientific papers pertaining to the results of biological investigations carried on by the Washington Department of Fisheries. A paper on the otter-trawl fishery pays particular attention to the petrole sole (Eopsetta jordani) and gives information on its age, rate of growth, maturity, food habits, migration, and the history and effects of the fishery. A paper on the coastal crab (Cancer magister) reports that preliminary results of the coastal crab investigation show no danger of overfishing. This paper also gives data on the life history and rate of growth of this crab. Another report presents information on the biology and liver vitamin-A

content of the dogfish (Squalus suckleyi). A further paper deals with the decline of the native oyster industry of Washington State with special reference to the effects of the sulphite pulp mill waste on the Olympia oyster (Ostrea lurida). The fifth report makes a contribution to the knowledge of the life history of the Japanese oyster drill (Tritonalia japonica). The final paper deals with a preliminary study of the soupfin shark (Galeorhinus zyopterus) fishery in Washington waters.

Arbeitsmethoden der Netzforschung (Working Methods in Fish Net Research). A. v. Brandt. Schriftenreihe der Reichsanstalt fuer Fischerei. Vol. 2. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany, 1947. 164 pp., 79 illus., 13 tables. In German.

This book contains information on the various methods used in testing twines, including the miscroscopic and other determinations of the types of fibers used; determination of the structure of the twines and the "twine number";tensile strength; elasticity; resistance to abrasion; suitability for net making; resistance to deterioration, etc. The section on testing nets and ropes covers measuring of width of meshes, weight, fouling, and testing of used nets. The last section deals with net preservation, including the chemical analyses of preservatives and their detection in net twine.

Vintersildfisket 1948 (Stor og-vaarsildfisket) (Annual Report on Winter Herring Fishery, 1948). Haakon Vikse. Fiskeridirektøren, Aarsberetning vedkommende Norges Fiskerier, 1948, No. 2, Cammermeyers Boghandel, Oslo, Norway, 1949. 52 pp. In Norwegian.

The Annual Report on Norwegian Winter Herring Fishery, 1948 is the most recent in a series which was started in the latter part of the 19th century. In addition to an account of how the season developed with regard to weather, occurrence of fish, men and equipment engaged, these reports now contain a diary written by a master fisherman (Hans O. Vindenes). Catch statistics are given by weeks and by county (herred) where the catch was taken. Craft statistics are given by provinces (fylker) and by type of gear, and they contain details on equipment such as radio echo sounder, etc. Also included in the report is an account of the inspectors' policing activities.

Reef Fishing in the Philippines. A. F. Umali and H. E. Warfel. Fishery Leaflet 354. United States Department of the Interior, Fish and Wildlife Service, Washington, D. C., U.S.A., December 1949. 28 pp., 4 tables, 8 fig. In English.

The authors state that the reefs of the Philippine Islands are of four types, and they list the more than 50 common commercial species of fish which inhabit these reefs. Annual production has reached 4,500 metric tons, about twice the 1947 production. Fishing methods used include: explosives; diving with spears; drag seines; and three kinds of movable drive-in-nets. One of the latter, developed by the Japanese, is described and specifications are given for its construction. At present, explosives are the most common fishing method, but a wasteful one: not all the fish killed are recovered, eggs and young are killed, and the reefs probably are being damaged. The writers suggest the wider use of lines and pots, the modification of present line and net gear, and the introduction of trammel nets.

O Mar de Angola (Angola's Sea). C. Carneiro. Emprêsa Gráfica de Angola, Luanda, 1949. 240 pp. In Portuguese.

This is a general review of the fisheries in Angola, Portuguese territory in Southwest Africa. It discusses the important commercial species of fish, as well as the types of gear used, and deals with the possibilities for greater development of the fisheries in this section of the African continent.

Report on the Newly Developed Key West Shrimp Fishery. Clarence P. Idyll. University of Miami, Marine Laboratory, Coral Gables, Florida, U.S.A., 14 February 1950. 11 pp.

The Marine Laboratory of the University of Miami reports the results of a preliminary investigation of a newly developed fishery for Brazilian shrimp (Penaeus duorarum) near, and extending southeast of, Key West, Florida, U.S.A. The grounds were discovered in September 1949 and are about 45 miles long and 10 miles wide. Fishing takes place mainly at night with standard shrimp trawl nets in 15 to 25 fathoms of water on white coral mud bottom. Coral is prevalent in the general area and is causing great damage to the gear. As yet, few boats are using fathometers to detect these areas. The shrimp population now being caught was undoubtedly present in former years, but development has been hindered by reluctance of fishermen to trawl on coral-studded bottom, plus the fact that the Brazilian shrimp is caught in large quantities only at night. The author recommends further exploration for other similar grounds in adjacent regions.

Construction of Farm Fish Ponds. J. M. Lawrence. Circular No. 95. Alabama Polytechnic Institute, Alabama Agriculture Experiment Station, Auburn, Alabama, U.S.A June 1949. 55 pp., 36 fig. In English.

The author first states the requirements for good fish ponds to be: (1) a topography that may be converted into a pond economically; (2) a subsoil that contains a sufficient amount of clay to hold water; (3) a water supply which is adequate but not excessive. He then gives detailed instructions for the construction of the pond.

Spiny Lobsters -- Identification, World Distribution, and U.S. Trade. F. A. Chace and W. H. Dumont. Commercial Fisheries Review. United States Department of the Interior, Fish and Wildlife Service, Washington, D. C., U.S.A., Vol. 11, No. 5 (May 1949), pp. 1-12. In English.

The authors summarize the known information dealing with the biology of the many species of spiny lobsters (crawfish), and also world production and United States trade. The section on biology includes information on structure, growth, size, age, food, and distribution. Some idea of the production of many countries is given by export statistics. It is noted that the trade in spiny lobsters in the United States is based mainly on imports, as domestic production contributes only a small amount of the total consumption. Included is a tentative key to all the known species except those of the genus Puerulus. This key is based upon characteristics of the tail.

UNITS

Weight, volume, capacity, length, and area are expressed in metric units. "Tons" and "quintals," when not qualified, therefore mean "metric tons" (1,000 kilograms) and "metric quintals" (100 kilograms), respectively.

The term "dollars," unless otherwise specified, refers to U.S. dollars.

CONVERSION FACTORS

Converted from:	To:	Multiplier
General		
Pounds	Metric tons	0.0004536
Hundredweight (112 pounds)	" "	0.050802
Hundredweight (100 pounds)	" "	0.04536
Quintal (112 pounds)	" "	0.050802
Short ton (2,000 pounds)	" "	0.9072
Long ton (2,240 pounds)	" "	1.0161
U.S. gallons	Liters	3.7853
Imperial gallons	"	4.546
Fisheries products		
Hectoliter (herring or oil)	Metric tons	0.093
Wet-salted cod and allied species	Dried basis	0.66

SYMBOLS

... Not available

ø Negligible (less than half the unit used)

- Nil

Other FAO Fisheries Publications

YEARBOOK OF FISHERIES STATISTICS - 1947

Bilingual, English and French, with Preface in Spanish. Augu
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